

an "Interrupt Switch" which controls the power delivered to appliances that turn themselves on and off automatically, or a "User Display" which reports the available power to users that turn on appliances manually, allowing the user to make informed decisions as to whether the appliance can be turned on without overloading the generator. The generator monitors are programmed with the maximum power allowed for the group of appliances monitoring the available power transmissions. The available power is defined as GAP for Generator Available Power. If all the appliances in the home are to have access to the full capacity of the generator, then one generator monitor is configured. If the user decides to allocate a percentage of the generator capacity to a group of appliances (i.e. water pump, furnace and refrigerator) and allocate the balance of the generator capacity to the remaining appliances, then two generator monitors are configured. Multiple generator monitors provide the user a greater level of control over the generator's power.

The embodiment of the invention uses interrupt switches to deny power to appliances that turn themselves on and off automatically, when GAP or available power levels are low. The invention informs users, via user displays, of the momentary GAP levels, along with the power needed to activate appliances in the area local to the user display. When GAP levels remain low for extended periods of time and interrupt switches deny power, keeping the supported appliances disabled for extended time periods, the interrupt switches transmit the disabled condition to user displays for reporting to users. Users can then turn off other appliances, freeing up generating capacity, allowing the GAP levels to rise and for the interrupt switches to return power and enable their appliances.

The embodiment of the invention provides for appliances with operating cycles of varying loads during the cycle. Given the generator monitor measures momentary load and transmits GAP levels on an ongoing basis, a provision for varying load levels in the operating cycle of an appliance such as a washing machine or dishwasher, needs an additional process to accommodate its power requirements. The present invention allows for a "power request" that instructs the generator monitor to lower the reference outputs, from which GAP levels are calculated, by a load level equal to the maximum load of the

appliance with the varying load cycle, and to maintain this reference output reduction for a time period equal to or greater than the duration of the varying load cycle.

In one aspect, the present invention is directed to an electric power monitoring system . The system comprises a source monitor for measuring momentary power output of an electric source supplying electric power to a power distribution system having at least one electric load. Comparing means compare the momentary power output with a reference load capability for the electric source to determine the ability of the electric source to support additional load, and transmit load capability data based on the load capability. At least one load control receives the transmitted load capability data and controls the supply of power to the at least one corresponding electric load based on the load capability data.

In a preferred embodiment, the reference load capability is determined based on at least one of a reference surge load and a reference continuous load. The reference surge load or reference continuous load are programmable according to time of day.

The source monitor may comprise multiple source monitors, and the means for comparing may compare the momentary power output with multiple reference load capabilities, and transmit multiple load capability data to respective multiple loads according to unique load identifiers.

The reference load is preferably adjusted in accordance with electric source drive capability, electric source efficiency, or predetermined load patterns, during a power source initialization.

The at least one load control may comprise an interrupt switch for interrupting the supply of power to the electric load when the transmitted load capability is less than a predetermined level. The interrupt switch interrupts the supply of power for an interrupt time period upon the return of power following a power failure condition. The interrupt time period is preferably set to delay the return of power for a period of time for the

purpose of reducing the total sudden load on the main power source at initial power return. The interrupt switch may further monitor electric power levels drawn by the at least one electric load and interrupt the supply of power to the electric load when the transmitted load capability is less than the monitored power levels of the at least one electric load. The interrupt switch may further delay interruption of the supply of power until the electric load has completed an operation cycle and may further delay interruption of the supply of power until the electric load has completed an operation cycle if the electric load's continuous load level is substantially equal to a predetermined level of normal operation.

The interrupt switch preferably further comprises a signal transmission system that transmits interrupt switch identifier data and interrupt switch status data. A switch open status is transmitted when the switch is open and a switch closed status is transmitted just prior to closing the switch for transmitting status data when the corresponding electric load is without power and thereby unable to emit any electromagnetic interference that would compromise the interrupt switch status transmission.

The system may further comprise a user interface indicating a condition of whether the electric source has sufficient load capability for supplying electrical power to the at least one electric load. The user interface receives and displays data from the at least one load control related to the electric load level, and interprets a first difference in surge load capability in excess of the continuous load capability and compares this difference to a second difference between a start up surge and continuous load of electric load and determines a power level reported to the user on the interface. The user interface may also report the interrupt switch status data to a user. The user interface further measures the time period an interrupt switch is open and reports data related the time period to a user. In the case where the electric source is a fuel-based generator, the source monitor measures fuel level in a fuel tank for the generator, and fuel data based on the fuel level is provided on the user interface. The user interface may also measure total electric power consumed by the power distribution system and fuel consumed for generating the power, and present a cost per energy unit for comparison with current or available utility rates.